

REMARKS/ARGUMENTS

Application of the cited prior art references in the Official Action has been carefully considered and the applied art carefully reviewed. In order to expedite prosecution in this application, claims 18-30 and 32-34 have been cancelled. Claims 17, 31, 35, and 36 were administratively withdrawn in the Official Action and, again to expedite prosecution, the withdrawal of these claims is acknowledged and is so indicated in the foregoing listing of claims. The cancellation of claims 18-30 and 32-34 is not and should not be construed as an admission that these claims are anticipated or rendered obvious by the prior art, or that they are withdrawn for any purpose related to patentability, or that they otherwise are not allowable. They have been cancelled merely as an expedient to expedite prosecution of the present application, and Applicant reserves the right to pursue the subject matter of these claims in a subsequently filed continuation application. Likewise, acknowledgement of withdrawal of claims 17, 31, 35, and 36 should not be construed as an admission that the election/restriction requirement and supporting arguments in the Official Action are correct or that Applicant concurs therewith. The acknowledgement, instead, is merely to expedite prosecution of the present invention. Claims 4-15 remain pending in the application.

Claim 5 has been amended to overcome the objection under 35 USC §112.

Independent claim 4, and thus its dependent claims 5-15, have been amended so that they recite the invention more clearly. These claims are believed to be in condition for allowance in view of the following discussion.

Independent claim 4 was rejected under 35 USC §103(a) as being unpatentable over Guhl et al. (US 6,055,783) in view of Lautenschlaeger et al. (US 5,234,730) or, alternatively,

Lautenschlaeger et al. in view of Guhl et al. Reconsideration and withdrawal of this rejection is solicited.

Guhl et al. disclose a window sash and assembly methodologies wherein the need to prefabricate integrated glass units (IGUs) is eliminated. An IGU is a preassembly used in window and door construction wherein two panes of glass are secured in a spaced apart configuration by a spacer that extends around the periphery of the unit between the glass panes. The panes are secured and sealed to the spacer with an adhesive sealant, and the space between the panes typically is filled with an insulating and/or inert dry gas such as, for example, argon. In Guhl et al., single glass panes, not IGUs, are installed directly in a window unit such as in the frame of a sash. The frame is configured such that, when the panes are installed, the frame itself holds the panes in a spaced apart configuration. Thereafter, the space between the panes can be evacuated of air and filled with argon or another appropriate gas. In this way, a preassembled IGU is not needed or required. In most embodiments of Guhl et al. (e.g. Fig. 4), the glass panes are moved straight down onto a bed of wet or uncured adhesive sealant, which immediately adheres to the glass. This process is known in the industry as "bed glazing." Fig. 8 of Guhl et al. shows an embodiment wherein individual glass panes are moved laterally into grooves the lineals. This technique is referred to in the industry as "groove glazing." The following discussion applies to this "groove glazing" embodiment of Guhl et al.

It is stated in the Official Action that Guhl et al. teach "assembling a window sash by *applying a sealant/adhesive 86/88 to the grooves* of four lineals 76a-d, urging the lineals on the edges of a *glass unit* until the ends of the lineals meet, and securing the ends of the lineals together to form the frame of the sash" (emphasis added). Careful review, however, reveals that this is not, in fact, what is taught by Guhl et al. First, as discussed above, Guhl et al. attempt to

eliminate the need for a glass unit or IGU in the first place (see Abstract; column 1, lines 42-64). Thus, contrary to assertions in the office action, Guhl et al. do not teach or suggest, and in fact teach directly away from, "urging the lineals on the edges of a *glass unit*."

Second, Guhl et al. do not teach applying a sealant/adhesive 86/88 (referred by Guhl et al. as the "primary sealant") to the grooves of four lineals prior to urging them onto a glass unit as asserted and relied upon in the Official Action. In the only embodiment (Fig. 8) where groove glazing is employed, the primary sealant 86/88 is applied not to the groove, but instead to the legs of a vapor barrier 82 that cover the inside walls of the grooves into which glass panes are received (column 10, lines 39-41). Guhl et al. also teach that the primary sealant 86/88 is a polyisobutylene adhesive sealant (commonly referred to as PIB). This sealant (see Exhibit A), is naturally tacky and adheres to any surface on contact. It remains permanently tacky and is used on surfaces to which other polymers do not adhere. PIB displays excellent adhesion both to glass and aluminum. Thus, the edge of a glass pane cannot slide across the surface of the primary sealant 86/88 as the glass moves into the groove because as soon as contact is made, the sealant's aggressive natural tackiness causes it to adhere to the glass and thus prevent further sliding movement. At best, the sealant will simply be pushed into the groove and roll up between the glass and the leg of the moisture barrier. There can be no sliding movement across the surface of such an adhesive.

This conclusion is further supported in the specification of Guhl et al. (column 10, lines 39-45) where, during the assembly process with the primary sealant already in place on the vapor barrier, the edge of the glass is placed "*onto*" the first receiving surface 78 (i.e. the groove wall with no adhesive) including "*onto*" (not slid across the surface of) the primary sealant. Most likely, this is possible because the groove is wider than the thickness of the glass and the edge of

the glass moves up the ramped receiving surface 78 toward and "onto" the primary sealant. At this point, the primary sealant 86/88 adheres the glass to the vapor barrier. Guhl et al. do not teach that the glass slides or can slide across the surface of the sealant. In fact, as mentioned above, such is not possible because of the natural tackiness of the primary sealant.

Third, in Guhl et al., the edges of the glass pane are placed onto the primary sealant as described above, and *then, only after the edges of the glass are in the grooves*, the secondary sealant is deposited in the groove, preferably by injection (see e.g. column 11, lines 2-18). Specifically, Guhl et al. teach that "after the glass panes are placed *onto* the receiving surfaces, *the next step* is to apply or deposit a fillet bead (the first and second secondary sealants 84 and 85) into the space between the receiving surfaces 78 and 80 and the outside surfaces 68 and 72 of the border portions 67 and 73 of the first and second glass panes 64 and 70 respectively." (emphasis added). While Guhl et al. mention (column 11, lines 22-30) that the sealants might be placed in the grooves prior to placement of the glass panes on the receiving surfaces, this technique is discouraged because it results, according to Guhl et al., in the sealant being displaced as the glass panes move into the grooves. In other words, since the sealants taught by Guhl et al. are inherently and naturally tacky, they would simply adhere immediately to the moving glass on contact and be pushed back into the back of the groove, creating poor adhesion and likely not forming the required seal. Thus, Guhl et al. teach against applying sealants to the groove before inserting the edges of the glass pane and cite the undesirable results of such an approach.

In view of the foregoing, it should be appreciated that the problem identified by Guhl et al., i.e. the undesirability of putting sealants in the groove before insertion of the glass, and the resulting need to inject sealant after insertion of the glass, was part of the impetus for

development of the present invention. Injecting sealant after installation of the sash unit is fraught with problems, including the time and labor required to inject the sealant and the often unsightly bead of sealant that can result around the periphery of the sash frame. A solution was needed, and the present invention provides a solution that completely eliminates the extra step of injecting sealant, does not result in any unsightly sealant bead, and can be automated for increased fabrication rates.

Lautenschlaeger et al. merely teach various cure on demand adhesives for bonding sheets of glass to a peripheral spacer to form a sealed insulating glass unit (IGU). In every application and process disclosed by Lautenschlaeger et al., glass is moved perpendicular directly toward and into contact with the adhesive. Nowhere do Lautenschlaeger et al. teach sliding glass across the surface of an adhesive. In fact, such sliding movement is inconsistent with the teachings of Lautenschlaeger et al. Lautenschlaeger et al. teach that the glass pane is adhered to a spacer by moving it generally perpendicular to the surface of the spacer, on which adhesive is applied, until an *initial, temporary bond is formed* by the naturally tacky nature of the adhesive (column 2, line 43; column 3, line 5; column 14, line 53; column 15, line 27). Moreover, at column 14, line 15, Lautenschlaeger et al. indicate that a tacky surface is desirable for the adhesive being discussed therein, as the tack excludes oxygen, thereby allowing a UV cure to take place. It also is taught that the resulting assemblies can be handled, if care is taken, prior to the curing process. The sheets of glass in a Lautenschlaeger et al. IGU need to be restrained by the temporary bond of the adhesive *against* sliding relative to the adhesive material. Thus, sliding movement of the glass across the surfaces of the adhesive is neither taught by nor consistent with the teachings of Lautenschlaeger et al.

In contrast to the teachings of Guhl et al. and Lautenschlaeger et al., Applicant's invention, as claimed in independent claim 4, is a method of assembling a groove glazed window component wherein at least one grooved lineal is applied to an edge portion of a glass unit. The groove of the grooved lineal has spaced apart walls that face one another on each side of the groove. Sealant is applied to at least one of the spaced apart walls of the groove and the sealant has an exposed surface bearing a dual state adhesive. Prior to sliding the lineal onto the edge of the glass unit, a temporary adhesion blocker is applied to the dual state adhesive to place the dual state adhesive in a first substantially non-adhesive state. The edge portion of the glass unit is then urged or moved into the groove while the dual state adhesive is in its first substantially non-adhesive state. In the process, the edge portion of the glass unit contacts and *slides across* the exposed surface of the dual state adhesive. Since the adhesive is temporarily in its non-adhesive state, this sliding movement is accomplished without pushing the adhesive toward the back of the groove, a problem recognized by Guhl et al. Instead, the adhesive remains in place between the wall of the groove and the surface of the glass. After the edge portion of the glass is in place, the temporary adhesion blocker is allowed to dissipate, thereby placing the dual state adhesive in its substantially adhesive state. This causes the adhesive to bond and seal to the glass unit, thereby securing and sealing the glass unit within the groove.

As discussed above, nowhere do the cited references teach or suggest a sliding movement of a glass unit across the surface of an adhesive. In fact, Guhl et al. properly point out that such would result in the displacement of the sealants to the back of the groove, which is highly undesirable. Guhl et al. identified the problem, but do not teach or suggest a solution, other than the old method of applying the secondary sealant after glass panes are in their grooves. The proposed combination of Guhl et al. and Lautenschlaeger et al. does not resolve this shortcoming

because Lautenschlaeger et al. teach that adhesives having an initial temporary bond prior to being cured with heat or radiation are required so that the glass units made with them can be handled prior to curing without the glass panes sliding around on their adhesives. Thus, replacing the Guhl et al. adhesives with those of Lautenschlaeger et al. would still exhibit the problems identified by Guhl et al. Further, there is no suggestion or motivation in the art or otherwise that such a combination of teachings be made. Lautenschlaeger et al. is a patent about making IGUs. Guhl et al. is a patent about eliminating IGUs in the construction of window sashes and other components. To combine the IGUs of Lautenschlaeger et al. with Guhl et al. clearly would destroy the intended purpose of Guhl et al. One of skill in the art cannot be motivated to combine one thing with another when such a combination would destroy the purpose of the first thing (see MPEP 2143.01). Even if the suggestion is only to replace the adhesives of Guhl et al. with the command cure adhesives used in Lautenschlaeger et al., this would only replace one tacky adhesive with a similar tacky adhesive and would not result in a teaching of sliding glass across the exposed surface of an adhesive in a substantially non-adhesive state in a method of assembling a groove glazed window, as claimed. In fact, the required temporary bond of the Lautenschlaeger et al. adhesives that allow the IGUs to be handled before the curing process would, if substituted for the adhesives of Guhl et al., raise all the same problems and issues discussed with respect to Guhl et al. alone.

Aside from issues raised by tackiness, there are other problems with using Lautenschlaeger et al.'s disclosed adhesives in the Guhl et al. groove glazed window (Fig. 8) that make such a combination untenable and therefore not suggested or motivated. Lautenschlaeger et al. teach anaerobic, heat activates, and UV cured adhesives. Anaerobic adhesives likely would begin bonding as soon as interfacial contact was made due to the exclusion of oxygen, thereby

inhibiting sliding movement of the glass. Heat activated adhesives likely would begin to melt and re-harden during the sliding process due to frictional heating. In addition, hot melt adhesives require pressing the panes together with compression rolls, as disclosed at column 6, lines 27-28 of Lautenschlaeger et al. The groove structure in Figure 8 or Guhl does not permit such pressing together. Additionally, UV cured adhesives would not be curable in Guhl et al.'s window, because the opacity of the sash material (as opposed to the transparent glass of Lautenschlaeger et al.) would shield the adhesive from the UV radiation. The existence of these potential problems further supports the position that it would not be obvious to one of skill in the art to make the combination of teachings in these two references, as suggested in the Official Action.

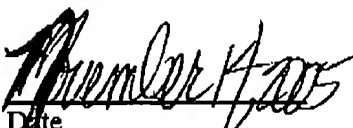
In view of the foregoing, independent claim 4, as now clarified, is believed to be in condition for allowance.

Dependent claims 5-15 also are allowable since their independent claim is allowable. Further, dependent claim 15 recites that the mid portion of the lineal is bowed toward the edge portion of the glass unit during step (c) of claim 4. In other words, the mid portion of the lineal is urged further onto the edge of the glass unit than its end portions. As discussed in the specification, this unique step counteracts the natural tendency of the adhesive to spring back a small amount after insertion, which normally would cause the lineal to bow slightly outwardly. By bowing the mid portion of the lineal toward the edge portion of the glass, this spring back results, instead, in a straight lineal. Nowhere does the art teach or suggest this unique step.


In summary, claim 4, as now clarified, and dependent claims 5-15 recite a method of assembling a groove glazed window of unique and unobvious characteristics and attributes not taught or suggested by the art of record. Accordingly, claims 4-15 are believed to be in condition for allowance and an early notice to such effect is earnestly solicited.

A notice of appeal has been filed concurrently with this Amendment.

Naturally, should there be questions regarding the foregoing, or if the Examiner feels that a telephone or personal interview might expedite prosecution, she is invited to call the undersigned any time at the number listed below.


Date

Respectfully submitted,


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EXHIBIT A

V I S T A N E X P I B

Vistanex Polyisobutylene Properties & Applications

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V I S T A N E X P I B

Applications of Vistanex Polyisobutylene

The special properties of Vistanex PIB – its impermeability to gases, its chemical inertness, its solubility in hydrocarbon solvents, the physical strength of the very high-molecular-weight MM grades and FDA approval in many applications – lead to a very broad range of applications in commerce, suggested by the list below:

- Adhesives
- Binders and coatings
- Caulking and sealing compounds
- Chewing gum base
- Drag reducer
- Pipe wrap
- Wax blends
- Polyolefin blends
- Grease and oil additives
- Uncured sheeting
- Viscosity modifier for solutions
- Electrical and cable insulation
- Puncture-sealing compounds
- Mechanical goods

Adhesives

The natural tack, stability and light color of Vistanex PIB make it an ideal base or component of adhesive compositions. The much higher molecular-weight MM grades give strength and resistance to flow. Adhesives most frequently are applied in a liquid form by techniques such as brushing, knife-coating or spraying. Vistanex PIB-based adhesives generally are dissolved in hydrocarbon solvents and further details on these solutions are available in the section *Processing and Handling* (pp. 3-5) and *Properties of Vistanex Polyisobutylene* (pp. 6-15).

Resins are often added to adhesives containing Vistanex PIB to improve the balance between tack and internal strength for specific applications. The most commonly used resins are hydrocarbon resins, alkylated phenols, terpenes, terpene-phenolics, ester gums, hydrogenated esters and others as illustrated by the following list:

- Cumar
- Escorez 1102, 1304, 1315
- Herculyn
- Pentalyn A, H, K
- Piccolyte S115
- Staybelite Ester 10
- Schenectady SP-567
- Wood Rosin

The plasticizers most frequently used in adhesives based on Vistanex PIB are paraffinic petroleum oils, polybutenes, coal-tar distillates, chlorinated hydrocarbons and esters.

Fillers also are incorporated often to reduce the cost and improve handling by lowering tack and stringiness. Factice (vulcanized vegetable oil) can be added to reduce cold flow, nerve and stringiness.

Several adhesive formulations are given in Table 9. These are typical formulations that can be modified to suit specific requirements. Formulations very similar to these are in commercial use.

Adhesives formulated with Vistanex polyisobutylene are used for a wide variety of substrates. Most commonly, Vistanex PIB is used in the three areas exemplified in Table 9, namely, paper cement, removable pressure-sensitive adhesives and surgical tapes. A number of specialty applications also have been found.

Table 9
Solvent Adhesives Based on Vistanex PIB

Paper Cement	
Vistanex PIB MM L-100	100
Hydrocarbon solvent	900
Pressure-Sensitive Adhesive	
Vistanex PIB MM L-120	100
Herculyn	30
Piccolyte S115	45
Parapol 950	70
Surgical Tape Adhesive	
Vistanex PIB MM L-100	100
Zinc oxide	50
Hydrated alumina	50
Parapol 950	75
Terpene-phenolic resin	25
Hydrocarbon solvent	600



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Just Add PIBs

By Dr. Timea Marsalko, Business Manager, PIB and Derivatives, BASF Corp., Florham Park, NJ; and Dr. Margit Hiller, Technical Marketing Manager, PIB and Derivatives, BASF AG, Ludwigshafen, Germany.

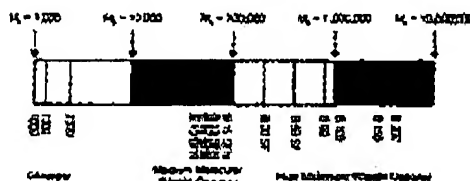


Figure 1. BASF PIB Grades

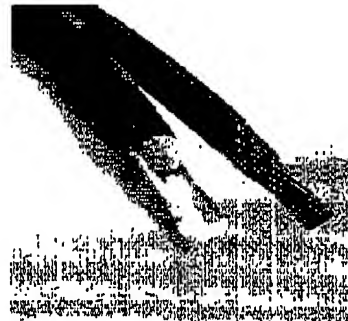
BASF has a long history of producing materials for improving adhesives and sealants formulations. BASF acrylates, for instance, have been widely used in the industry. This article focuses on the company's contributions through the growing presence of polyisobutylenes (PIBs) in adhesives and sealants.

PIBs are not new. BASF invented the materials and has marketed a range of polyisobutylenes since the late 1930s. Since then, additional molecular weights and performance characteristics have been added to offer new options and new applications to formulators. The current portfolio of PIB products includes low-molecular-weight (trade named Gilssopal), medium-molecular-weight (trade named Oppanol B 10 SFN – Oppanol B 15 SFN) and high-molecular-weight grades (trade named Oppanol B 30 SF – Oppanol B 200).

Polyisobutylenes are aliphatic polymers and are widely used in solvent-based or melt-based formulations. They are an excellent choice of raw materials for applications that are moisture sensitive or must be water insoluble. Depending on the application, different molecular weight grades or combinations of several PIB grades or combinations of PIB and butyl rubber are used to achieve the properties of the final products. Generally, low-molecular-weight products are used as tackifiers and/or plasticizers, whereas medium- and high-molecular-weight products are used to adjust properties such as flexibility, elongation, cohesive strength, and gas barrier

performance. With the correct choice and ratio of PIB(s), formulators can tailor peel and tack as well as extend the lifetime of the finished goods.

Several different systems are used to compound adhesives and sealants using solvent or melt technology. Polyisobutylenes are often used in non-curable applications, and in several cases they can be interchanged with (replacing) or performance-enhancing butyl rubber components in butyl systems. These butyl systems contain polyisobutylene (completely saturated polymer), butyl rubber (double bonds in the molecular chains), or a combination of both. Butyl rubber is favorable when it comes to cohesive strength and creep resistance, whereas polyisobutylene offers good flexibility, tack, and peel strength. To adjust the properties of a formulation to the required end use, combinations of both polymer types are often used.



Polyisobutylenes are used to seal joints, to seal and protect electrical wiring, and to protect body cavities from moisture.

Although PIBs do not have more than one double bond per polymer chain, they are considered to be non-crosslinkable products by conventional crosslinking chemistry (sulphur or peroxide cure). There are, however, several special crosslinking modes in which PIBs could become crosslinkable, such as via radiation curing.

Polyisobutylenes have better aging characteristics than rubber-based (especially natural rubber-based) systems. PIB-based products remain permanently tacky and are used on surfaces other polymers do not adhere to.

TYPICAL APPLICATIONS

The window sealant industry in Europe, governed by higher energy standards, is dominated by double-glazing window sealants. PIB is the base polymer and the main component in these formulations. In these sealant systems, mainly Oppanol B 15 or mixtures of Oppanol B 15 and Oppanol B 10 are formulated. Oppanol is primarily used because it has excellent barrier properties and excellent flexibility, even at low temperatures. Furthermore, it is able to seal hermetically, due to its tackiness and cold flow, to even rough glass surfaces.



Pressure-sensitive and removable tapes are usually formulated with the use of one or two different molecular weight PIBs and butyl or chlorobutyl rubber.

New systems emerging on the

technical data

PRC® 488

PRC® 488 polyisobutylene

Description

PRC® 488 polyisobutylene is designed to be used as a primary moisture seal in the manufacture of insulating glass units. PRC® 488 polyisobutylene displays excellent adhesion to both glass and aluminum and exhibits outstanding moisture vapor resistance.

PRC® 488 polyisobutylene forms an excellent primary seal and may be used in conjunction with conventional secondary sealant materials.

Use

PRC® 488 polyisobutylene has been specifically designed as a primary moisture vapor seal to be used in the manufacture of dual seal insulating glass units.

Application

PRC® 488 polyisobutylene, when purchased in slugs, may be extruded onto release paper or directly to the desired surface. For specific recommendations or extruder temperatures, contact your PRC-DeSoto International PRC® Insulating Glass Sealants representative.

Availability

When ordering this product, designate PRC® 488 polyisobutylene sealant and specify color.

Product	Designation - slugs (diameter x length, inches)
PRC®-488-50 S	47 gallon/460 lbs
PRC®-488-27 S	9.75 x 8.75
PRC®-488-15 S	7.25 x 8.25
PRC®-488-4.5 S	4.375 x 7.25
PRC®-488-3/32 S	2,100 ft/case
Color	Black or gray

Technical service

Complete technical information and literature are available from your PRC-DeSoto International PRC® Insulating Glass Sealants sales office.

Technical data

Note: All values for this product are typical for the material but are not intended for use in specification or acceptance inspection criteria because of variations in testing methods, conditions, and configurations.

Property	Requirement	Test method
Color	Black/grey	Visual inspection
Appearance	Smooth, no lumps or grain	Visual inspection
Cone penetration	50-65 dmm	ASTM D217 300g total weight
Solids content	99% minimum	45 mn/350°F
Specific gravity	1.10 -1.23	ASTM C135 water immersion
Weight per gallon	9.4-10.25 lb	
Shear strength	10-20 psi	30 mil thickness 1 sq in overlap
Elongation	350%	
Low temperature	Flexible	Aluminum substrate
Flexibility	No adhesion loss	at 29°C
Adhesion to glass		
at 0°F, 77°F, 158°F (-18°C, 25°C, 70°C)		Excellent
After immersion in water		Excellent
After exposure to ultraviolet light through glass		Excellent

**PRC-DeSoto
International**

PRC® Insulating Glass Sealants

PRC-DeSoto International, Inc.
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Gloucester City, New Jersey 08030
(609) 456 5700 Fax (609) 742 0890
A PPG Industries Company

Date issued: 8/99

Supersedes: 6/99

PRC® 488 polyisobutylene

After immersion in water and ultraviolet light exposure	Excellent
Adhesion to metal at 0°F, 77°F, 158°F (-18°C, 25°C, 70°C)	Excellent
After immersion in water	Excellent
Temperature range	-30°F to 150°F (-34°C to 65°C)
Application temperature	230°F to 285°F (110°C to 140°C)
Fogging	no visible fogging

(Tested in accordance with SIGMA specification 65-7-2, 1974 edition and Canadian specification CAN2-12.8-M76)

Health precautions

This product is safe to use and apply when recommended precautions are followed. Before using this product, read and understand the Material Safety Data Sheet (MSDS), which provides information on health, physical and environmental hazards, handling precautions and first aid recommendations. An MSDS is available on request. Avoid overexposure. Obtain medical care in case of extreme overexposure.

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